

6. Bourne. (*Mabbenus*.) Quart. Journ. Micro. Sci., vol. 36, 1894, p. 11.
7. Bourne. (*Moniligaster*.) Quart. Journ. Micro. Sci., vol. 36, 1894, p. 307.
8. Eisen. "Californian *Eudrilidae*." Mem. Cal. Acad. Sci., vol. 2, 1894.
9. Michaelsen. "Die Fauna Sudwest Australiens: *Oligochaeta*." 1907.
10. Michaelsen. *Oligochaeta* from India, Nepal, Ceylon, &c. Mem. Ind. Mus., vol. 1, 1909.
11. Michaelsen. "*Oligochaeten* von verschiedener Gebieten." Mitt. a. d. Naturhist. Mus., vol. 27, 1910.

ART. XXI.—*New Species of New Zealand Empididae (Order Diptera).*

By DAVID MILLER.

[Read before the Otago Institute, 3rd December, 1912.]

Plate I.

THE following are descriptions of four new species of *Empididae*. Generically they agree with the characters given by A. L. Melander in his "Monograph of the North American *Empididae*," with the exception of one species, *Brachystoma adelensis** (Plate 1, fig. 2). In this fly the eyes are holoptic in both the male and female, and do not approach below the antennae; the anal angle is not gone; and connecting the 2nd and 3rd longitudinal veins is a supernumerary cross-vein. The other three species belong to the genus *Hilara*—*H. kaiteriensis*.† *H. philpotti*, and *H. benhami*; the second is named after Mr. A. Philpott, of Invercargill, who has generously presented to me a large collection of *Diptera*, and the third after Dr. W. B. Benham, of the Otago University, to whom I am greatly indebted for his kind assistance.

In all cases the antennae, legs, and wings were mounted dry, and examined under a compound microscope.

Fam. EMPIDIDAE.

Genus HILARA Meigen.

Melander, Trans. Amer. Ento. Soc., vol. 28, p. 262 (1902).

TABLE OF SPECIES.

Thorax with 4 brown stripes .. .. .	..	..	..	<i>H. benhami</i> .
Thorax yellow, without stripes .. .. .	..	..	..	<i>H. kaiteriensis</i> .
A minute grey littoral species .. .. .	..	..	..	<i>H. philpotti</i> .

Hilara benhami sp. nov. Plate 1, fig. 3.

Head spherical, eyes bare, dichoptic, and deeply emarginate at the base of the antennae. Frons greyish-brown with a central darker spot just above the antennae, the orbits dark brown, and 2 rows of delicate greyish and divergent fronto-orbital bristles, the outer extending from just above the antennae to a little below the ocellar triangle, the inner occupying the first third of frons from the triangle (fig. 1), which is rounded and promi-

* Captured on the mainland, opposite Adele Island, Tasman Bay.

† At Kaiteriteri, in Tasman Bay, a large collection of *Empididae* was obtained.

ment, occupying the greater part of the vertex; the ocelli are orange, and between them are delicate bristles, a pair of which are larger and divergent, representing the ocellar pair. Face greyish-brown with silvery reflections, slightly hairy, and in profile rounded at the epistome; the oral margin is dark brown with a light-brown tomentum and scattered brown hairs, while the lower margin of the head is slightly sinuated and comes into contact with the lower corner of the eye (fig. 2). Antennae dark brown, with a greyish tomentum, about as long as the height of the head; the 1st joint, bearing short stiff and delicate bristles, is longer than the 2nd and about one-half as long as the 3rd, minus the flagellum; the 2nd joint is spherical, with stiff delicate bristles; and the 3rd, which is broad at the base but tapering distally, is black with a greyish tomentum; the flagellum is less than one-half the length of the 3rd joint, but has more tomentum, and bears a minute naked terminal appendage. Proboscis horny and shiny-black, tapering to a point, and about as long as the height of the head; the palpi

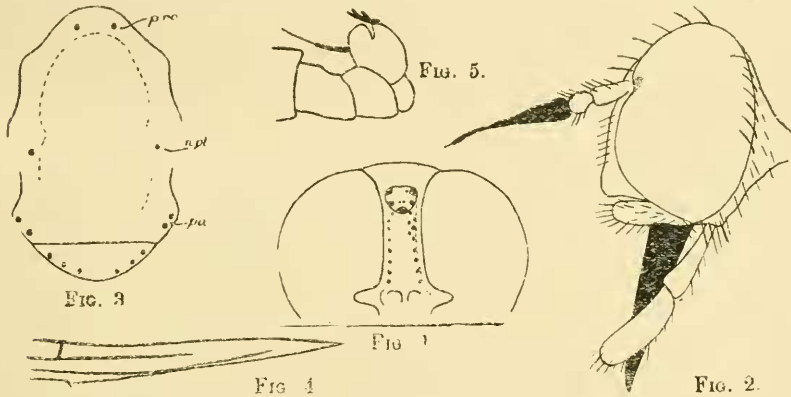


FIG. 1.—Dorsal view of head, showing chaetotaxy.

FIG. 2.—Profile of head.

FIG. 3.—Dorsum and scutellum, showing chaetotaxy. *pro*, pro-thoracic bristles; *npl*, noto-pleural bristles; *pa*, post-alar bristles.

FIG. 4.—Showing auxiliary vein and structure of 1st longitudinal.

FIG. 5.—Hypopygium in profile.

are brown with scattered hairs, about as long as the proboscis, broad and flattened distally, and notched in the centre of the posterior margin. Occiput with brown and greyish reflections, and bearing delicate short bristles.

Thorax prominent, but not humped, grey, with 4 dark-brown almost black stripes, the outer ones being anteriorly shorter than the inner, while before the scutellum the dorsum is brownish-grey, with a delicate median stripe in certain lights. On the dorsum are rows of short delicate bristles, a pair of divergent pro-thoracic bristles (fig. 3, *pro*), a single noto-pleural (*npl*) below the line of the dorsal suture, a pair of post-alars (*pa*), and a few hairs on the humeri and pro-pleurae. Scutellum broad and greyish-brown, but darker towards the base, bearing convergent marginal bristles except on the apex, towards which they strengthen. Halteres long, with light-brown stalks and darker heads.

Wings faintly tinged with brown, the stigma and veins dark brown, the latter lighter towards the articulation. Auxiliary vein evanescent at the tip, not reaching the costa; the 1st longitudinal appears as two veins which

are approximated for a short distance beyond the origin of the 2nd vein, but are separated both proximally and distally, the upper branch being lost in the pigment of the stigma, while the intervening space is dark brown (fig. 4); 2nd vein almost straight, being but slightly upturned distally to meet the costa; 3rd vein forked, the anterior branch leaving at right angles, curving forward almost immediately and then gradually upwards to the costa, the posterior branch being slightly down-curved: the anterior transverse vein oblique, the posterior, which is strongly sinuated, is one and a half times its own length from the margin of the wing; anal cell shorter than the 2nd basal, the anal cross-vein, which is parallel to the posterior margin of the wing, forming an obtuse angle with the anal vein, the anal angle being developed.

Legs brownish-black, slightly shiny and hairy with a lighter tomentum, the femora not thickened, the anterior legs being the shortest. A few bristles ventrally on the posterior and dorsally on the middle femora but none on the anterior, the coxae of which are shorter; in certain lights, the tibiae with a brownish appearance proximally and dense longer hairs distally on the ventral side of the anterior tibiae, which are thickened to carry the enlarged metatarsi, the following tarsal joints of this pair of legs possessing a few bristles amongst the hairs of the vestiture; the posterior tibiae bear a dorsal pre-apical bristle,* while ventrally the apical corner is produced, to a tubercle; the posterior metatarsi are nearly three times as long as the following joint, while those of the middle legs are not twice as long.

Abdomen long and linear, of a dark-brown colour, lighter below; on the sides long and scattered hairs, denser on the 1st segment; on the anterior corners of each segment and on the sides of the last two a grey tomentum; dorsally and ventrally convex, but beyond the 4th segment the ventral surface is flattened, the connecting membrane of the dorsal and ventral plates disappearing. The hypopygium, which is prominent, swollen, and upturned, is hairy with a scattered grey tomentum; projecting forward is a narrow, pointed, shiny-black process, from the apex of which extends a long stiff golden hair (fig. 5), while on the upper side is a black chitinous plate toothed on its upper side and projecting over a deep notch in the hypopygium.

♂. Length, 7 mm.; wing, 8 mm.

Hab.—Captured on manuka above a beach at Astrolabe, Nelson, January, 1912. Not common.

Hilara kaiteriensis sp. nov. Plate I, fig. 1.

Head a little broader than long, eyes bare and dichoptic, deeply emarginate at the base of the antennae, and occupying the greater part of the side of the head. Frons tawny, with a yellow tomentum and a medio-longitudinal darker line in certain lights, the orbits being tawny without tomentum and the fronto-orbital bristles being arranged as in *H. benhami*. Ocellar triangle rounded but not occupying most of the vertex between the eyes, with yellow reflections (darker in certain lights) and a pair of strong but not long ocellar bristles and a pair of weak post-ocellar ones; ocelli orange. Face easily seen in profile, tawny with a yellow tomentum, and ending considerably above the lower eye-margin; the epistome projecting slightly; cheeks narrow and tawny with a yellow tomentum, the oral margin rounded

* In the illustration it is drawn on the ventral side.

and posteriorly angulated, bearing stiff bristle-like hairs. Proboscis as long as the head (fig. 6), tawny proximally but shiny-black distally, the palpi as long as and applied to the proboscis, tawny with a darker tomentum, and shaped as in *H. benhami*. Occiput with a yellow tomentum and a row of post-orbital bristles, while on the lower portion are scattered bristles and golden hairs. Antennae nearly as long as the height of the head, the 1st and 2nd joints tawny with a yellow tomentum, not long and of about equal length, each having a pre-marginal whorl of short black bristles; 3rd joint black but tawny at the base, shaped as in *H. benhami*, about two and a half times as long as the first two joints together and with a scattered yellow pubescence, the pubescent flagellum is 2-jointed and about a quarter the length of the 3rd antennal joint; the 1st joint is short, and the 2nd ends in a terminal appendage nearly one-half the length of the second.

Thorax not prominently humped, of a yellow colour, due to a dense tomentum, but tawny on the margins of the humeri and dorsum before the wings where the tomentum is absent. On the dorsum is a pair of rounded longitudinal ridges, not reaching the yellow scutellum, but ending in a

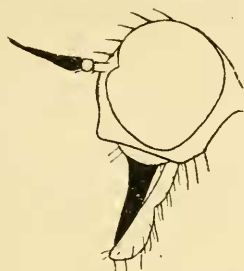


FIG. 6.

FIG. 6.—Profile of head.

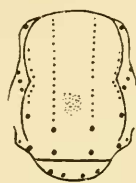


FIG. 7.

FIG. 7.—Dorsum and scutellum, showing chaetotaxy.

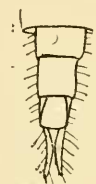


FIG. 8.

FIG. 8.—End of abdomen.

median transverse depression, between which and the scutellar suture is a short tubercle-like ridge. Each ridge carries a row of closely set dorso-central and post-sutural bristles ending in 2 large widely separated convergent bristles (fig. 7), the acrostichals being represented by 4 rows of short closely set bristles, which terminate in an irregular clump just posterior to the line of the dorsal suture; there is a single humeral bristle and short stiff black hairs, a single supra-alar bristle, a pair of post-alars the anterior one on the angle being a stiff hair, a row of strong noto-pleurals, a row of weak pre-suturals (?) with a corresponding row posterior to the dorsal suture, while on the dorsum between the pre-suturals and the noto-pleurals and also between the anterior dorso-centrals and the humeral are scattered a few weaker ones; on the pro-thorax is a pair of straight and divergent tawny bristles, while the scutellum bears 4 convergent marginal bristles, the apical pair being crossed. The pleurae are bare and halteres tawny.

Wings hyaline, but distally the marginal cell is faintly clouded with yellow, and near the origin of this cell, in line with the apex of the auxiliary vein, is a brown fusiform spot; the 1st section of the 3rd vein, the anterior transverse and the lower margin of the 2nd basal cell are also bordered with brown, giving a banded appearance to the wing. Auxiliary, 2nd, and 3rd veins formed as in *H. benhami*; anterior transverse vein not oblique, the posterior sinuated, not parallel to the hind margin of the wing, and nearly

twice its own length from the margin in which ends the last section of the 5th vein; the 1st basal cell partially closed anteriorly by a half-formed transverse vein from the 1st longitudinal, the 2nd basal cell a little longer than the anal cell, the anal cross-vein curved into the anal vein and parallel to the posterior margin of the wing. At the articulation there are a few bristles on the costa.

Legs tawny, the vestiture being yellow on the ventral side of the anterior tibiae, while the tibiae and tarsi of all the legs have a dense yellow tomentum. Dorsally on all the femora is an apical semi-whorl of longer bristles; and ventrally on the posterior, middle, and anterior tibiae is a similar arrangement of black apical bristles, while dorsally is a pair of apical bristles. Anterior coxae almost two-thirds as long as the femora, the metatarsi not dilated, and longer than the following joint, as are those of the other legs, but on each joint of the posterior and middle tarsi is a semi-whorl of apical bristles, while the anterior tarsi possess a few longer hairs.

Abdomen black, with a thin grey tomentum and scattered yellow hairs; dorsally and ventrally convex, tapering apically and terminating in 3 tawny segments with a pair of apical styliform lamellae (fig. 8) which are darker in certain lights. Six abdominal segments visible from above, the posterior margin of each, excepting the 1st, being brownish, while the base of the 2nd and the apex of the 6th are tawny in certain lights, and dorsally on each side of all the segments is a pair of black spots, the anterior one being more lateral than the posterior.

♀. Length, 4.5 mm.; wing, 5 mm.

Hab.—Captured on a mapau-tree, in the sun, near Dunedin, October, 1912. Not common.

Hilara philpotti sp. nov.

♂. Head globular, notched in front to receive the antennae. Eyes bare, dichoptic, and deeply emarginate at the antennae, forming a part of the lower margin of the head, and in profile confined to the anterior half (fig. 9). Frons wide, not much narrowed anteriorly, but depressed and slightly notched, with a rounded ridge-like portion at the antennae. Ocellar triangle not prominent, but very wide and narrow; consequently the ocelli and the long divergent yellow ocellar bristles are widely separated; fronto-orbital bristles represented by a row of stiff greyish hairs extending from above the antennae to below the ocellar triangle. Antennae black, with a thin grey tomentum; 1st joint short, with a very few hairs; 2nd joint globular, with a whorl of greyish hairs; 3rd black, broad at the base and tapering to a point; arista terminal, not a quarter the length of the 3rd joint, the short terminal appendage being black at the tip. Face seen in profile projecting at the epistome, which is above the lower margin of the eye. Occiput large and rounded, bristly and with light-brown hairs, the lower posterior angle of the head produced to a rounded projection, while the lower margin bears long silvery hairs. Proboscis

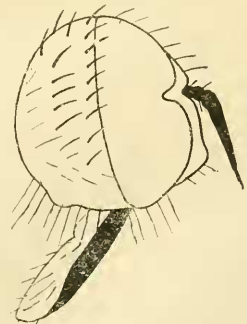


FIG. 9.—Profile of head.*

* In this diagram the antennae are enlarged, being drawn out of proportion.

black, not so long as the height of the head, the palpi brown and hairy, as long as and applied to the proboscis, ensheathing the tip.

Thorax not prominently humped, with rows of minute black bristles, among which are a few upright grey hairs which on the scutellum form 4 marginal convergent bristles. Wings greyish with a light-brown stigma, the veins being very light greyish-brown and weak towards the articulation. Auxiliary vein very weak, otherwise as that of *H. benhami*; 1st vein comparatively thick and apparently bifid distally (fig. 10); 2nd vein almost straight, but slightly upturned at the costa; 3rd vein forked and slightly angled at the bifurcation, the anterior branch leaving at an acute angle, and slightly sinuated; anterior transverse vein at right angles, the posterior but faintly sinuated and about twice its own length from the margin,

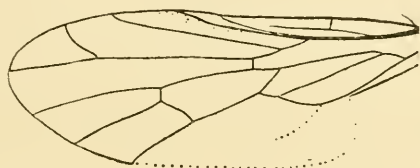


FIG. 10.—Wing.

the last section of the 5th vein reaching the margin; anal cell shorter than the 2nd basal, the anal cross-vein parallel to the posterior margin of the wing and curved into the anal vein. Halteres light greyish-brown.

Legs grey, but darker brown in certain lights, with a vestiture of greyish short hairs, the anterior and posterior femora being laterally flattened and angulated at the middle; the anterior metatarsi are about twice as long as the following joint, both of which are flattened and slightly enlarged, the middle metatarsi about one and a half times as long as the following joint, and those of the posterior legs about one and three-quarters the length of the following.

Abdomen ending in a cone-shaped protuberance (in profile), grey with spots, short delicate bristles and lateral tufts of silvery hairs.

♀. Broader and darker than the ♂. the vertex wider and the frons considerably narrower at the antennae, the 2nd antennal joint greyish-yellow, and the abdomen is apically pointed.

♂ and ♀. Length, 2.25 mm.; wing, 3 mm.

Hab.—Captured on marram-grass and sand, Purakanui, January, 1910. Not abundant.

Bio.—On account of the protective greyish colour of this species, it is seen with great difficulty when at rest.

Genus BRACHYSTOMA Meigen.

Melander, Trans. Amer. Ento. Soc., vol. 28, p. 259 (1902).

Brachystoma adelensis sp. nov. Plate 1, fig. 2.

General colour dull-shiny brownish-black.

♂. Head about as wide as the thorax, the eyes bare, occupying the whole of the side of the head, and emarginate below the antennae, where they are dichoptic, but holoptic above; ocellar triangle rounded, prominent in profile, of a dull-black colour, with a thick tomentum; ocelli prominent,

of a very dark madder-brown; a pair of strong proclinate ocellar bristles and a similar but larger pair of post-ocellars; frons narrow, wedge-shaped and small, with dense brownish tomentum. Antennae dull black, microscopically pubescent, the distal portion of the flagellum and the terminal appendix dark brown; 1st joint short and bristly; 2nd joint globular and bristly, the outer ones longer; 3rd joint about twice as long as the 1st and 2nd together, the terminal flagellum almost as long as the 3rd. Face not seen in profile, black with a greyish-brown tomentum; the lower margin of the head with grey hairs; proboscis and palpi withdrawn, but in profile is a hairy shiny-black knob-like protuberance somewhat resembling a palpus

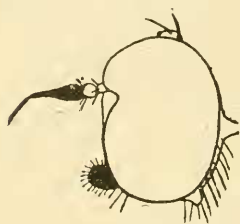


FIG. 11.—Profile of head.

(fig. 11); occiput black with a greyish-brown tomentum and stiff hairs, the lower corner being considerably produced.

Thorax short, prominently humped (fig. 12), the dorsum brownish-black, but lighter just before the scutellum, and with a lateral light-brown stripe from the post-alar callus to the humeri, widening anteriorly; the chaetotaxy is represented by a few stiff humeral hairs, 2 rows of short light-coloured hairs, lengthening posteriorly, each ending in 2 stronger bristle-like post-suturals just before the scutellum; the post-alars weak, but those opposite the base of the wing more distinct, as well as the marginal ones of the scutellum. Pleurae greyish-brown, due to a tomentum, bare but for 3 bristle-like curved hairs above the anterior coxae (fig. 12). Scutellum light brown on the margin, but darker towards the base.



FIG. 12.—Side view of thorax.

Wings brown, the stigma very dark, a clearer space between the end of the 2nd and the anterior branch of the 3rd vein, in the 2nd, 3rd, and 4th posterior cells, in the discal cell, and less distinct ones in the other cells; the veins dark brown, but lighter distally; the auxiliary vein, which on account of the folding of the wing appears approximated to the 1st vein, ends in the costa; 2nd vein strongly upturned at the tip; 3rd vein forked, the strongly sinuated anterior branch arises at an acute angle, and, curving forward for about half its length, bends backward to the costa, the posterior branch being straight; a little before the middle distance between the insertion of the anterior transverse vein and the bifurcation of the 3rd longitudinal is a supernumerary cross-vein at right angles connecting the 2nd and 3rd veins; this singular cross-vein is constant in both wings of all the specimens of this species in my possession;* the anterior branch of the

* I have observed supernumerary cross-veins in other species of *Diptera*, but, as a rule, they are not constant in both wings, and, as in the case of *Calliphora hortona*, are absorbed as the fly matures after pupation. Is it therefore possible that the cubital appendices, which in some cases form specific characteristics, are not trustworthy features? Space permitting, I could enumerate a few cases of New Zealand *Tachinidae*, for example, where the cubital appendix of the 4th vein is sometimes present or longer in one wing and absent or shorter in the other. In *B. adelensis*, the anterior branch of the 3rd vein and that of the 4th vary in the strength of the sinuation. Plate 1, fig. 2, is a moderate form.

4th vein is strongly sinuated into the 1st posterior cell, after which it continues its original course to the costa; anterior transverse oblique, the posterior sinuated into the discal cell and parallel to the posterior margin of the wing; the 1st basal cell is closed proximally by a cross-vein from the 1st longitudinal; anal cell longer than the 2nd basal, the anal cross-vein forming an acute angle with the anal vein, which is slightly curved at the tip to meet the posterior margin of the wing; the anal angle developed. Halteres with a light-brown stalk and a brown head.

Legs not especially elongate, blackish-brown, but lighter in certain lights, more particularly the femora. Posterior legs the longest, but not thickened: femora with dorsal and ventral bristles, the former short and extending the full length of the femora, the latter longer and occupying the proximal three-quarters only; tibiae slightly thickened distally and clothed with a dense vestiture of short bristle-like hairs, while ventrally is a long pre-apical bristle and dorsally a double row of 4 long bristles with numerous shorter ones; metatarsi about three times as long as the following joint, and bearing a double row of longer bristles and a pre-apical, upright slightly curved bristle on each of the other joints. Middle legs short: femora swollen, narrowing distally, and constricted at the articulation with the coxae; the dorsal bristles short, the ventral on the proximal half a little longer, and those on distal half nearly straight and much larger, with smaller ones interspersed: tibiae of a uniform thickness, slightly curved and angulated at the knee, but not with a dense vestiture; ventrally on the distal two-thirds is a double row of short but strong bristles, becoming smaller apically, and dorsally a pair of very long spines, one proximal, the other central; there are no apical bristles, but the lower corner is slightly produced tooth-like: tarsi shortened, the vestiture of brownish hairs with longer bristles like those of the posterior tarsi, but the apical spines are short. The metatarsi not quite twice as long as the following joint. Anterior legs: femora club-shaped, tapering distally, with long bristles on the ventral distal half only; tibiae slender, of a uniform thickness, with 3 long dorsal spines and a 4th very long proximal one; tarsi slender, the metatarsi elongate, about three times as long as the following joint, and with a vestiture similar to that of the middle tarsi; anterior coxae not greatly elongated.

Abdomen elongate, linear, and brownish-black, but greyish on the sides of the base, not ventrally dilated, and with a few white hairs on the sides, longer on the 1st segment; on the anterior margin of each segment is a row of spots (sometimes hidden by the overlapping of the preceding segment), and a pair of discal ones on each side, the anterior spot being nearer the lateral margin. Hypopygium prominent, in profile (fig. 13) the upper

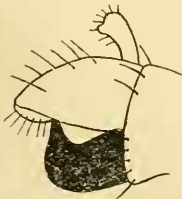


FIG. 13.—Side view of hypopygium.

portion, roughly speaking, cone-shaped, from the upper side of which projects a curved knobbed hairy structure with a pre-apical posterior tubercle, the lower portion being a massive shiny-black chitinous claw strongly upturned towards the apex; from above is a pair of massive claws, one opposed to the other (fig. 14) (between the bases of which arises the knobbed

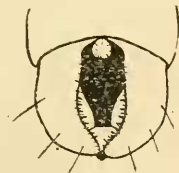


FIG. 14.—Dorsal view of hypopygium.

structure), the inner edge of each bearing short strong spines, the interveining space being occupied by the lower claw, which is apparently

spatulate at the tip; the lower claw excepted, the hypopygium is dull and bristly with a few long hairs.

I have a specimen, which I take to be a female, differing from the male in the broad (and shrivelled) pointed abdomen and in the greater length of the wing.

♂. Length, $6\frac{1}{2}$ mm.; wing, $5\frac{1}{2}$ mm.

♀. Length, 4(?) mm.; wing, 6 mm.

Hab.—Common on the sea-beach near Adele Island, Tasman Bay, January, 1912.

Bio.—This fly darts hither and thither over the surface of still pools, and occasionally jumps into the air. Usually there are a number together

EXPLANATION OF PLATE I.

Fig. 1. *Hilara kaiteriensis* sp. nov.

Fig. 2. *Brachystoma adelensis* sp. nov.

Fig. 3. *Hilara benhami* sp. nov.

ART. XXII.—A New Species of *Macquartia* (Order Diptera).

By DAVID MILLER.

[Read before the Otago Institute, 6th August, 1912.]

THIS description follows the system adopted by Charles H. T. Townsend in his "Taxonomy of Muscoidean Flies."* I take this opportunity of expressing my indebtedness to the Smithsonian Institution for the assistance which I have received.

Fam. TACHINIDAE.

Genus *MACQUARTIA* R. Desvoidy (1830). Hutton, Trans. N.Z. Inst., vol. 33, p. 46.

Macquartia kumaraensis† sp. nov.

Head.

Ptilinal suture narrowed and rounded at the top; its sides, for the greater part, divergent, but slightly convergent towards the termini, which are below the level of the lower eye-border, and in line with the vibrissal angles; the cheek-sutures consequently ascending (fig. 2, *k*).

Ptilinal area oval, occupying about one-third of width between the lower corners of the eyes.

Longitudinal median line of *facial plate*, in profile, projecting forward below the antennae (fig. 1, *a*), but restricted and flattened at vibrissal angles.

Foveae double, deep and elongate, flattened upon the inner and rounded upon the outer edge (fig. 2, *d*).

* Smi. Inst. Coll., vol. 51 (1908).

† This species was captured in the vicinity of a promontory known as Potato Point, hence the name *kumaraensis*. "kumara," in the Maori vernacular, signifying a sweet potato.